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ABSTRACT

A project to determine how children and members of their social environment regulate the stimulation they receive from each other is presented. The general procedure employed was the descriptive and experimental analysis of the behavior of subjects in social interaction situations, as recorded on videotape. Types of dyads videotaped include mother-infant dyads in a caretaking-play setting, mature (adult) dyads in semistructured focused interaction, and preschool peer dyads in preacademic task settings. Results of the mother-infant study include: (1) Cry-fuss pauses of less than one second were considered socially nonfunctional; (2) A basic mother infant behavior code was established; and (3) Sampling statistics routines will be included to detect significant differences in the average temporal locations of sequential dependencies between events. Nonverbal regulators in mature dyads were found to include manual illustrative and emphatic movements, facial affect displays, orientational and attentional movements of the head and body, and adjustments to tension. Videotapes of social behavior of preschool children performing preacademic tasks revealed that the performance of low income preschool children is affected by a combination of the familiarity and competence of peers present in the performance situation. With familiarity and performance controlled, family economic level appears not to have any notable implications for preschool performance. These studies indicate that as early as the preschool level, existing human resources in the peer group can be arranged to provide more optimal conditions for testing ability and promoting learning in social or academic tasks. (CK)

Title: ACQUISITION AND PERFORMANCE OF REGULATORY SOCIAL RESPONSES

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Introduction

The general goal of the project, initiated in the previous project period, was to determine how children and members of their social environment regulate the stimulation they receive from each other. Temporal analyses of social interaction were addressed to the question: What response classes, under what contextual contingencies, influence interpersonal responses; and what developmental processes account for the acquisition of the observed response patterns?

The general procedure employed was the descriptive and experimental analysis of the behavior of subjects in social interaction situations, as recorded on videotape. The research design called for subject responses to be coded in detail, with their temporal locations identified. Natural interaction situations were to be analyzed for nonrandom sequential patterns of verbal and nonverbal response categories, and for evidence of developmental trends in the patterns. Experimental probes were introduced to test for causal relations between selected contingent events.

Several technical problems had to be solved to fulfill the above goals. Unobtrusive videotape recording capacities were required which maintained full views of subjects throughout interaction. Videotapes had to be repeatedly scorable at variable speeds on the basis of brief time-based units. And statistical programs were needed for sensitive time-based sequential analysis of multivariate data. Progress on the technical requisites will be reviewed below in the context of substantive studies.

Several types of dyads were videotaped in social interaction settings appropriate to their developmental level. These groups were not intended to be representative of all common dyadic arrangements. Rather each was focused on particular substantive questions. However, all were expected to reveal generally applicable influence processes. The three studies to be reviewed in this report consisted in: (1) Mother-infant dyads in a caretaking-play setting throughout the "general social attachment period" (third through sixth month of infant); (2) Mature (adult) dyads in semistructured focused interaction; and (3) preschool peer dyads in preacademic task settings. The mother-infant study, initiated during the project period, is considered most relevant to this report and thus will receive fullest attention. The other two studies, which were initiated earlier and completed during this period, will be described more briefly; and references will be given to separate extended reports for the interested reader.

Mother-Infant Dyads

Two mother-infant pairs were videotaped for fourteen hour-long sessions in a specially constructed caretaking and play setting, from the third through the sixth months of age of the infant. This age range constitutes the normative period of first general attachment of children to other persons (Schaffer & Emerson, 1964). Thus it was expected to provide evidence of the initial development of interpersonal influence mechanisms. The period was also ideal for obtaining videotape records of social interaction from a technical standpoint: the infants were old enough to be typically alert and to elicit reasonably high rates of adult attention; yet they had not yet attained the locomotive capacity to permit separation from their mother beyond camera range (cf. Rheingold & Eckerman, 1970). Of five mothers originally contacted on the basis of public

birth notices, the mothers of two male infants were retained for longitudinal study on the basis of their willingness to return throughout the specified three-month period. They appeared to be typical members of caucasion middle-class families.

However unlike most mother-infant studies, the purpose of the present investigation was not to derive normative data on the appearance of typical response categories. Rather the primary aim was to determine the degree to which the future rate and contingencies of occurrence of response categories could be accounted for by their prior social context. Such evidence is important for determining the range of applicability of social learning theories of behavior. The possibility of such theories as accounts of behavior acquisition has been repeatedly demonstrated in studies of behavior modification. However, the sufficiency of such theories as explanations of naturally occurring behavior has rarely been tested. Natural descriptive contingency analysis in combination with experimental probes is necessary for the latter purpose.

The variety of mother and infant responses in our dyads to which this analysis is applicable cannot be determined until the videotapes are coded in detail. However, particular attention is being given to one variable--the infant cry--because of its typical occurrence at this stage of infancy and its theoretical significance for the development of social relationships. The cry was considered an aversive stimulus to the mother. Thus maternal acts associated with the onset of infant crying should diminish in occurrence over time, while maternal acts associated with the termination of crying should be reinforced. Two experimental variations were introduced to supplement this analysis. On selected days, either toys or immediate maternal reactions to infant distress or both variables were withheld. It was expected that distress states would be longer under delayed

maternal reactions, and that a greater repertoire of maternal acts would be exposed to crying contingencies if toys were not available. The first two sessions were considered periods of adaptation to the setting, while the third through fourteenth sessions (with occasional separations due to holidays or illness) were selected for analysis. The sequential format of data collection for one of the dyads is displayed in Table 1.

Table 1 about here

Several technical requirements related to videotaping were fulfilled during the study. A zoom lens was used to film the interaction (through a one-way window) so that the greatest behavioral detail possible was recordable at each distance between mother and infant. A device was assembled to add a visible time-based count to the videotapes: an additional camera was focused upon a high-speed digital counter, the image of which was inserted in a corner of the videotape via a special effects generator. To make the tapes compatible with the computer-assisted video-retrieval system at the University of California Medical Center, an external stable synchronization signal was used in later sessions. To facilitate stability of video signals in recording, playback, and duplication of tapes, oscilloscopic and video processing equipment was interfaced with the recording system.

Progress to date toward three goals of the mother-infant study is described below:

Cry-fuss analysis. No standard objective definition of the boundaries of a unit of crying or fussing is known to the investigator, although interobserver reliability on occurrence during arbitrary time units has been reported (e.g., Moss, 1967), and spectrographic distinctions between differentially elicited

cries have been identified (Wasz-Hockert, Lind, et al., 1968). However, the present sequential-analysis approach requires that events be identified in terms of their points of initiation and termination. To provide an empirical basis for the determination of a cry or vocal fuss unit which is likely to have social significance, crying and fussing in the present videotapes were initially scored as units separated by pauses of ½ second or greater. Maternal behavior rarely was initiated in pauses less than 1 second; thus pauses less than one second were considered socially nonfunctional and subsequently were ignored in defining continuous fuss-cry units. The distributions of intercry pauses for the entire samples next were determined.

Table 2 here

Table 2 lists the frequency distribution of intercry (and interfuss) intervals summarized in approximately 20 second units up to about a half minute. It will be noted that most cries are separated by very short intervals, with the distribution dropping off rapidly. The shortest intervals were usually pauses for breathing during otherwise continuous crying; slightly longer intervals typically were due to brief maternal interventions or occurred in the process of accerating from initial fussing to continuous crying. In most of these cases the infant appeared to be in a persistent state of distress, with brief pauses consisting only in interruptions of an otherwise continuous condition. Consequently one level of analysis will focus on these apparent cry-fuss states. All such states separated by at least 90 seconds have been located in the videotapes of each infant. These and "control" episodes selected from prolonged noncrying intervals will be analyzed for associated maternal activities. Initially maternal elicitors of crying will be identified; then maternal reactions to crying will be

analyzed for their temporal association with termination of crying to determine the degree that future maternal reactions are predictable from the success of earlier ones.

Mother and infant behavior codes. Most behavior coding schemes rely upon verbal definitions of categories. The present study seeks to supplement and improve upon the potential reliability and trainability of coding systems by providing explicit videotaped referents to all coded events. In this way any unwritten subtle distinctions, or resolutions of ambiguous cases, by a coder can be communicated to others. Our initial step in the derivation of categories was to have a practiced observer dictate maternal and infant acts in as fine detail as possible, using his natural language. From the transcriptions of these dictations readers listed all apparently distinguishable events. Observers then attempted to apply the resultant categories to episodes from the videotapes, adding or differentiating categories where necessary. The system is being gradually shaped into a standard format on the basis of interobserver agreement in the application of category definitions. The codes are being organized primarily around potential varieties of stimulation of the infant--visual, auditory, tactile, vestibular, etc. Initially very fine distinctions are being made. These will be retained if they show continued reliability of scoring, sufficient replicability of occurrence, and prove to have some social significance (i.e., some evidence that they are responded to by others). The current entries in the code for maternal behavior in the third month of one subject are briefly listed in Table 3. All of the categories that have had sufficient numbers of entries to date (i.e., all major categories and some subcategories) have received interobserver agreement indices between 70 and 100 percent--based upon real-time video-playback and allowing one second displacement for differential reaction time.

Table 3 and Table 4

An example of three minutes of maternal behavior during the fifteenth week of her infant is shown on Table 4. (Training in the use of the emerging codes from the videotapes can be provided to other coders for legitimate research purposes.) A preliminary infant category system has been assembled but is not yet defined with sufficient provision to permit acceptable interobserver reliability on the basis of verbal definitions. It will be constructed on the same basis as the mother code. The infant code currently includes measures of visual orientation (identifying objects including other persons and the infant's own body); physical orientations and movements such as leaning and reaching (again identifying objects); object explorations such as touching, manipulating, kicking and pounding; adaptive movements such as postural adjustments, motor excitement, sneezing, yawning, and choking; facial expressions (where visible); and vocalizations.

It is important in this "microanalysis" of interpersonal events that we include behavior categories of normative interest to developmental psychology. To this end, consultations are being held with developmental linguistics at the University of California and Stanford University to determine potentially functional categories of maternal and infant vocalizations. It is also of interest to determine whether the present level of behavior coding will provide different information than more established and inferential systems. Thus a copy of the videotape of a session has been sent to Mrs. Maxine Schoggen at the Peabody laboratory (DARCEE) where she has agreed to apply the procedures of ecological psychology.

Sequential analysis programs. After sequences of mother-infant interaction are coded, they will be analyzed for nonrandom sequential dependencies between events. A program is being developed for this purpose in cooperation with the University of Kansas Computation Center. The program, entitled Multidimensional Dichotomous Time Series Analysis of Social Interaction DATA (MDT for short), will employ SNOBAL language and will detect chains of associated events of varying length. Onset and termination times of events, including experimental probes, will comprise the input data. Sampling statistical routines will be included to detect significant differences in the average temporal locations of sequences. Preliminary phases of the program have been successfully tested on previously-coded samples of adult interaction.

Nonverbal regulators in mature dyads

One perspective of early childhood education is that it gradually encourages more adult forms of behavior. This process is not necessarily linear; i.e., there are many normative responses unique to intermediate developmental stages. Yet at least in the area of developmental linguistics, research indicates that by preschool age children generally demonstrate linguistic mastery comparable to adults. A less well-studied phenomenon is the development of nonverbal components of communication and the variables governing their occurrence. Adult communication is characterized not only by linguistic utterances, but also by nonverbal activities such as manual illustrative and emphatic movements, facial affect displays, orientational and attentional movements of the head and body, adjustments to tension, etc. (cf. Ekman & Friesen, 1969). These acts in themselves, or in combination with verbalizations, often function to regulate and modify the social interaction process (Rosenfeld, 1965, 1966a, 1966b, 1967; Argyle, 1970). Thus it is important to determine the conditions under which a functional nonverbal

communicative repertoire is developed. One reason for conducting the mother-infant study above was to identify the processes by which nonverbal social regulation skills develop.

Unlike the area of linguistics, however the components and structure of normative nonverbal communicative functions is still poorly understood. Consequently, studies of dyadic interaction among fully socialized persons also are being conducted along with the developmental studies, with personnel support supplied by other agencies. In the present project period, we have analyzed videotapes of six adult dyads in semistructured interaction, over 300 consecutive utterances each. The aims of the study were to determine the varieties of nonverbal responses that typically occur in adult interaction, and particularly the immediate social contexts of the responses from which their communicative functions could be inferred. Since the identification of adult forms of social interaction is only indirectly relevant to early childhood education, the study is briefly summarized in Appendix IA. The interested reader also is referred to a 135 page report ("Nonverbal Responses in Conversation and Influence") prepared by Gunnell and Rosenfeld at the Kansas Center, containing details of the procedures and results of the investigation.

Typical classes of nonverbal activity that were scored are defined in the accompanying Appendix IB. They included smiles, head nods, head tilts, hand and arm movements, postural adjustments, and self-contact activities. Given the present interest in the social consequences of behavior, the nonverbal events were subgrouped on empirical and theoretical grounds into a potential set of social regulators (termed "nonverbal recognitions"), which were contrasted with the remaining activities. A major source of comparison was the degree to which the response groups could be accounted for by conventional conversational roles

(cf. Ervin-Tripp, 1969): i.e., while the subject was listening to the other, while speaking to the other, and in the juncture pause between these two states. In addition the nonverbal response categories were tested for redundancy of occurrence and for their differential use as rewards and punishments of selected response content by the other person.

The results in Appendix IC indicated that the various nonverbal recognition activities are not highly redundant. The results summarized in Appendix ID indicates that these acts do play a role in speaker-switching in contrast to the other acts, and function similarly to verbal attentional variables. They were less consistently employed for the modification of the content of utterances than was expected. This function is being further investigated in more controlled followup studies.

Some evidence of the emergence of these conversational regulatory processes is expected to emerge from the mother-infant analyses described earlier. Even in the earliest episodes (3 month old infants), conversation-like interchanges often were structured by parents. For example, one of the mothers emitted linguistic utterances in a highly inflected voice, usually terminating with a rising (question-like) pitch, along with eye contact and a subsequent pause (a typical adult conversational procedure). If the infant returned the eye contact and emitted a coo, the mother would repeat the act, often for extend periods of time. A pilot videotape analysis of conversation between 3-year-olds in the previous project period indicated that virtually all of the adult forms of nonverbal regulation already had been acquired. Clearly much more research is needed on nonverbal development in the first three years.

Preschool Peer Dyads

Videotapes of social behavior of preschool children performing preacademic

tasks also were analyzed. These tapes had been collected by the investigator during prior studies supported by Project Head Start. The original purpose for collecting the tapes was to keep records of the exact procedures of the study. However, the recently analyzed results of the study revealed that the performance of low income preschool children is somehow affected by a combination of the familiarity and competence of peers present in the performance situation and that the effect takes place even before the peer has had an opportunity to perform on the task and thereby demonstrate his competence to the subject. Thus the videotapes were inspected to determine how the effects took place.

The results of this analysis are fully described in a 35 page draft of a report being prepared for publication (Rosenfeld, Gunnell, and Russell, "Effects of Peer Characteristics on Preschool Behavior of Low Income Children"). Appendix II contains the abstract of the report, as well as transcriptions of videotaped episodes contrasting the typical interactive processes of subjects in the two most significant conditions -- when paired with familiar low-performing peers versus with unfamiliar high performing peers. The results supported the following conceptualization.

Peer familiarity is likely to be a potent determinant of performance, the direction of its effect depending upon the interaction of several variables. These include the current social and task-oriented repertoire of the peer, the subject's prior exposure to this repertoire, and the response opportunities permitted by the task and setting. Familiarity with chronically high-performing peers in a task-oriented setting is particularly likely to facilitate performances which reflect the capabilities of the subject.

The peer's typical performance level is likely to be associated with a more general behavioral repertoire that he exhibits in a task-oriented situation. The

typically low-performing peer who, it may be assumed, has poor task-orientation and who is attentive to extra-task aspects of the situation is likely to convey a willingness to engage in extra-experimental behavior. On the other hand, typically high-performing peers tend to exhibit a competitive style which implies a concentration on task requirements and an unwillingness to change the focus of the situation to interests other than high performance. This style, which tends to be exhibited even in the absence of an opportunity to perform the task, can delimit the possible social and task responses of the subject. Familiarity with the peer might facilitate this effect by leading the subject to anticipate the peer's repertoire, by increasing the likelihood of the peer displaying that repertoire, and by increasing the subject's confidence in the resistance of the peer's exhibited repertoire to attempts at distraction. In addition, previous classroom experience with the peer may permit easier adaptation by the subject to performing in otherwise unfamiliar circumstances.

Finally, with familiarity and performance controlled, family economic level appears not to have any notable implications for the preschool performance and influence processes investigated in these studies. The fluctuations in performance of most of the subjects in these studies indicated that they were capable of high performance under certain social conditions which were not present in initial testing situations. Thus their classification as low-performers was based to some extent on behavior indicating inattention to the task rather than ability. It is clear that more experimental arrangements must be studied to pinpoint the characteristics of peers that affect particular responses of children in particular settings and to identify the mechanisms by which this influence is exerted. Yet even these initial studies do indicate that as early as the preschool level existing human resources in the peer group can be arranged to provide more optimal conditions for testing ability and promoting learning in social or academic tasks.

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Table 1

Videotaping Sessions Analyzed
for Mother-Infant Dyad-A

SESSION	DATE	AGE	TREATMENT
3	11- 5-69	15w-4d	BASELINE
4	11-19-69	17w-4d	BASELINE
5	12- 5-69	19w-6d	NO TOYS
6	12-17-69	21w-4d	BASELINE
7	1- 7-70	24w-4d	TOYS, M IGNORES
8	1-29-70	27w-5d	BASELINE
9	2- 3-70	28w-3d	TOYS, M IGNORES
10	2- 9-70	29w-2d	BASELINE
11	2-11-70	29w-4d	NO TOYS, M IGNORES
12	2-24-70	31w-3d	BASELINE
13	3-10-70	33w-3d	NO TOYS
14	3-17-70	34w-3d	BASELINE

Table 2

Frequency of Occurrence of Intercry Intervals by Length for Two Infant Subjects

Interval Length (1 count = .566 Sec)	Frequency S(a)	S(b)
0 -- 10	116	100
11 -- 20	29	37
21 -- 30	15	15
31 -- 40	6	7
41 -- 50	6	7
51 -- 60	5	3
61 -- 70	4	3

Table 3

Initial Mother Code for 3-Month Infants

1) Visual Orientation Toward Infant

1u - infant cannot see mother's face because of location

2) Private Behavior

a. while sitting
b. while walking
c. potential stimulation of infant while engaging in private behavior

3) Stimulus Control - identify which stimulus mother is controlling according to Infant Code 1. a-j

a. jiggles stimulus
ai. mother jiggles stimulus with infant's body
b. moves stimulus closer to him but not in his reach
c. moves stimulus toward him within infant's reach
d. moves stimulus to him
e. moves stimulus away from him - within sight
f. moves stimulus away from him - out of sight
g. picks up infant's dropped stimulus & gives it back to him
h. interruption or restraint of infant's physical contact with an object

Stimuli

(a) ball
(b) mobile
(c) hard toy
(d) infant body
(e) mother
(f) soft toy
(g) pacifier
(h) diaper
(i) blanket
(j) infant seat (belt)

4) Vocalization

a. arousing
b. soothing
c. negative
d. neutral
e. whistle-click
f. imitating
g. singing
h. nursery rhyme
i. laugh-chuckle

Suffixes

dq = rising stress in terminal clause

n = utterance contains infant's name

0 = utterance is directed toward person other than infant

5) Relocation of Infant

a. toward stimulus - brings infant to a stimulus
b. away from stimulus - removes infant from stimulus
} identify stimulus

c. general shift - rearranges & adjusts infant's posture
d. pushes infant in a walker
e. toward her without picking him up
f. hear her - picks him up

5) Relocation of Infant (Continued)

1. hold on lap-distant (near knees)
2. hold on lap-close (near torso)
3. hold in front
4. carry-walking (not toward stimulus)
5. carry-standing (not toward stimulus)
6. sits down with infant (from a standing position)
7. stands or sits infant up-away (on an object)
8. stands him up-on lap
9. on torso (holds him so his face is near hers & infant is next to her torso)
10. on torso (cheeks touching)

Add "s" to code if relocation results in a new stimulus being presented to the infant - also identify stimulus (e.g. 5f9sb).

g. far from her
1. to couch-to infant seat
2. to couch-to blanket-face up
3. to couch-to blanket-face down
4. to couch-sitting
5. to couch-lying face up
6. to couch-lying face down
7. to floor-to infant seat
8. to floor-to blanket-face up
9. to floor-to blanket-face down
10. to floor-sitting
11. to floor-lying face up
12. to floor-lying face down
13. to infant seat on table
14. moves his hand away from an object she is privately engaged with
15. to table-sitting

6) Facial Configuration (scored-onset)

a. smiling
b. scowling
c. making faces

7) Physical Contact with Infant

a. touches
b. jiggles with hand
c. jiggles with body
d. pats
e. burps infant
f. tickle-pinch
g. stylized (such as "so big", "patty cake", or "peek-a-boo")
h. faces rub
i. ties shoe-brushes hair
j. supports
k. changes diaper
l. hugs
m. pacifier

7) Physical Contact with Infant Continued)

n. wipes mouth, nose, hands
o. kisses
p. pulls clothing
q. removes restraint
r. restrains limbs

8) Spatial Relocation

a. moves to infant-distant (requires walking or crawling)
b. moves to infant-close (from close enough to touch him with her arm outstretched)
c. away-distant
d. away-close

9) Activity not Visible

a. smiling
b. scowling
c. making faces

Table 4

One Coder's 3-Minute Real Time Sequential Coding of Mother of 15-Week Infant-A

Count	Code	Count	Code
1500 - 1521	1u	1683 - 1685	4dq
1510 - 1512	3ac	1694 - 1695	4e
1522 - 1575	1	1696	5q4
1522 - 1523	7a	1698 - 1759	1
1522 - 1537	5	1701 - 1710	4a
1526 - 1533	6	1711	4e
1534 - 1561	3ac	1712 - 1719	4a
1562 - 1563	4a	1715	3dq
1572 - 1575	3ac	1724	3ef
1576 - 1580	1u	1728 - 1729	4a
1580 - 1587	3acf	1733 - 1734	4dq
1581 - 1597	1	1764 - 1766	4a
1586	4d	1773 - 1782	8a
1593 - 1597	3ac	1782	1
1598 - 1623	1u	1782 - 1790	4a
1603	4d	1788 - 1789	5c
1614 - 1616	3ac	1790 - 1798	3ac
1621 - 1626	7n	1793 - 1795	4e
1624 - 1654	1	1799	4d
1629 - 1636	4a	1807	4d
1637 - 1649	4d	1809 - 1811	3ac
1655	4dq	1812 - 1817	4a
1673 - 1676	1	1812 - 1821	5c
1679	4dq	1821 - 1824	4d

Note: (1) Each count = .567 sec. (2) Order within tied counts To be determined by slow motion analysis.

Appendix I

Study of Nonverbal Responses in Adult Conversation and Influence

SUMMARY

This investigation was concerned with selected aspects of two broad questions: What is the natural communicative context within which certain nonverbal responses occur? And, do particular nonverbal responses fulfill selected communicative functions? Three gross natural contextual situations associated with conversational turn-taking were chosen for study: listening, speaking, and mutual pausing. Experimental control over communicative function was restricted to influence of a subject's motivation to modify a conversational response in another person. The "double-agent" procedure, developed by Rosenfeld and Baer (1969; in press) to study verbal behavior, was adapted to the study of nonverbal communication. The procedure provided experimental control over conversational turn-taking and gave relatively unambiguous criteria for defining a communicative function in on-going conversation.

A subject and the confederate of the experimenter were involved in an interview task in which the subject acted as a Rogerian interviewer. In addition to his role as interviewer, the subject considered himself to be an "experimenter" in a social influence study. In the first part of the interview, the baseline, the subject observed the confederate's verbal behavior and cooperated with the experimenter in selecting a verbal characteristic of the confederate's speech which he would attempt to in

fluence. In the second part of the experiment, the subject attempted to influence the confederate's speech by delivering experimenter-designated, extra-communicative "reward" and "punishment" in those patterns that he felt would be most successful in producing the desired effect. For all subjects, the speech characteristic chosen for influence was the fluency or disfluency of the confederate's utterance, which, in actuality, was programmed by a random schedule averaging 50 percent each. Video-tape records of six subject-interviewers were scored for 16 real-time nonverbal categories and for two verbal categories. Association of the nonverbal categories with the three conversational roles and with the independent variable--the fluency or disfluency of the confederate's utterance--was studied separately for each subject. Co-occurrence of categories was also investigated.

The three conversational turn-taking roles employed were partially successful in differentiating the categories of nonverbal behavior investigated. All of the categories were more prevalent in the speaking intervals. However, pausing and listening intervals distinguished two groups of categories--the nonverbal recognitions, which are the so-called "social reinforcers", and non-recognition activity. Nonverbal recognitions, composed primarily of smiles and nods, occurred more frequently in pausing than in listening intervals; their occurrence coincided with the period in which the subject had or shared the floor and was most likely to have the visual attention of the confederate. Nonverbal recog-

nitions occurring in pausing intervals appeared to be intentionally communicative and to regulate conversational flow. On the other hand, nonrecognition activity occurred more frequently in listening than in pausing intervals. Its function appeared to be more varied than that of the nonverbal recognitions. The hypothesis that nonverbal behavior would functionally differentiate during influence was not strongly supported by this investigation. However, the negative results are most plausibly attributed to problems with the task.

Appendix IB

Nonverbal Categories

The nonverbal variables selected for study are real-time variables. That is, they were reliably scored by the experimenter without the aid of slow-motion devices, although repeated viewing of the video-tapes was used to increase reliability and to allow for the scoring of simultaneously occurring categories. It was assumed that real-time variables would have a high probability of being discriminated by the interactants in an on-going conversation. Many of the variables have been used or suggested by previous research. As many distinctions as seemed potentially useful were made, these being limited by the criteria of reliability at real-time observation and of occurrence with sufficient frequency to merit study.

The following categories were scored; abbreviations employed in computer print-outs are included in parentheses.

Smile (SMIL). The smile is defined as a noticeable change in facial expression with an upward curving or the corners of the mouth. The word "change" should be emphasized here. Subjects who kept their mouths in a relatively constant smiling position were scored for smile only at the onset of a smile. Smiles have been found to be the cue most highly correlated with the judgment of positive affect (Tomkins and McCarter, 1964). It is as emblems or symbols rather than as spontaneous expressions of affect that smiles are often encountered in social interaction. In this role of symbol, the smile may be called a facial gesture.[3] Smiles are classified

[3] The term "facial gesture" is employed by Ekman (personal communication).

as affiliative acts by Rosenfeld (1966a,b), discriminating approval seekers from approval avoiders. Smiles have been effectively used as social reinforcers in conditioning studies (Krasner, 1958).

Positive Head Nod, or Nod (NOD). The nod is a medial movement of the head with at least one change in direction. Rosenfeld (1966b) finds nods to be positively correlated to smiles, although his work suggests that nods serve other functions in addition to instrumental affiliative ones. Like smiles, nods have been used effectively as social reinforcers in conditioning studies (Krasner, 1958).

Change of Head Position, or Change (C). This is a distinct movement or tilt of the head which is not a nod. A scanning of the data prior to coding indicated that the change occurred frequently and appeared to function in two or possibly three of the functions defined by Ekman and Friesen (1969b): specifically, illustrator, regulator, and, possibly, adaptor. The illustrator is tied to speech, illustrating or accenting ideas. The regulator maintains and regulates the back-and-forth conversational flow. The adaptor is a movement learned as part of adaptive efforts to satisfy self or bodily needs. Although these functional categories may overlap, it was anticipated that the relation of the category to the conversational flow would clarify its function for a specific occurrence.

Gesticulation (G). The gesticulation is any noticeable movement of the arm or hand, not in moving contact with another part of the body.

Gesticulation was expected to occur with speech, functioning as an illustrator in Ekman's sense. Rosenfeld (1966a,b) found gesticulation to differentiate approval seeking from approval avoiding females. Freedman and Hoffman (1967) have employed a similar category called "object-focussed" hand movements. These generally occur with speech and can be reliably classified into five illustrative functions.

Shrug (SHR). The shrug is a momentary lifting or contracting of one or both shoulders. The shrug was hypothesized to function as an illustrator or, perhaps, as an emblem of indifference or doubt.

General Manipulation, or Manipulation (M). This category includes any discriminable movement of the finger or hand which brings it into contact, as in touching or rubbing, with a body surface or with an extension of a body surface, such as clothing or jewelry. Manipulation is also scored for any change in position of hands which are touching and for the rubbing of an arm against trunk, neck, or leg. (Movements scoreable as head manipulation, see below, are not scored as general manipulation.) Rosenfeld's research suggests that the manipulation may be related to discomfort. He found that manipulations lead to disapproval by the partner in a dyad (1966a) and that significantly more manipulations were given by subjects interviewed by disapproving interviewers than those interviewed by approving interviewers (1967).

Head Manipulation (H). This includes the touching, tapping, or rubbing of some area of the head or face, but not of the neck, or of some

object affixed to the head or face (e.g., glasses, ear-rings, hair ornament) with hands or arms. Head manipulation was considered separately from general manipulation in light of the difference in head and body cues discovered by Ekman (1965; Ekman and Friesen, 1967). The face was found to be the chief site of affect display whereas the body offers more intensity cues.

Lip Manipulation (LIP). This includes lip biting or moistening. Lip manipulations were separated from head manipulations on topographical grounds, the former not involving the hands but only the mouth.

The postural restrictions imposed by the experimental set-up limited consideration of positions and movements to the upper trunk. The imposed restrictions included instructions to the subject to talk directly into a microphone positioned in front of his chair and operation of two stationary foot-pedals. Continuous visual attention to his "client" was an implicit norm in the subject's role, further restricting the range of bodily positions. Of the positions exhibited by the subjects, two positions of the hands and forearms were most evident and most reliably scored at real time.

Hands Touching, or Touch (T). This position was scored when the hands were touching each other throughout an interval. The position leaves room for a variety of arm positionings (side, front) for manipulations, and even for an occasional gesticulation.

Arm Lock, or Lock (L). The arm lock was scored when the arms were folded and locked together across the chest or abdomen throughout an interval. This position is more a part of a total bodily configuration than hands touching. It inhibits almost all visible forms of manipulation, gesticulations, and most bodily shifts.

Both the touch and the lock occurred in runs of some length; in other words, the occurrence of one of the categories in an interval could not be assumed to be independent of its occurrence in the preceding interval. The beginning and ending of these runs were scored and analyzed separately. Touch Start (TS) was scored for the interval in which the touch began. Touch End (TE) was scored for the interval in which the touch ended. Lock Start (LS) and Lock End (LE) were similarly scored for the arm lock runs. Finally, one other positional category was cored.

Body Shift (B). Body shift was scored for a distinct and gross change of trunk position starting from the waist or hips. Trunk movements which were a result of some other nonverbal category and which did not require any obvious energy apart from that required in the execution of that other response were not scored as body shifts.

Verbal Categories

Unlike the confederate, the subjects were not instructed to pause between utterances. When scoring the subjects' verbalizations, the experimenter employed a linguistic definition of utterance given by Davis (1937, p. 44). Each of the subjects' utterances--roughly equivalent to sentences--

was then scored as one of the following categories given, with the exception of paraphrase, by Rosenfeld (1966a, p. 598): question, answer, paraphrase, initiation, and recognition. If one or more of the verbal categories occurred within an interval, a verbalization (VERB) was scored for the interval. Only the recognition category or "rec", which is conceptually related to some of the nonverbal categories, is treated separately in this analysis.

> Recognition (REC). The recognition is conceived as a highly general conversational analogue to the more restricted set of verbal "reinforcers" that have been systematically employed in laboratory studies concerned with the control of behavior (cf. Krasner, 1958). Recognitions are utterances, usually brief, which indicate attentiveness to the immediately preceding speech of the other subject, but add no other information. Common examples are "mm-hmm," "hmmm," and "yeah." They also include repetition of the other person's preceding responses, requests for repetitions ("really?", "no kidding?"), and compliances with such requests, when it is clear that no information other than attentiveness is exchanged by these responses. (Rosenfeld, 1966a, p. 598).

Rosenfeld (1966a) finds recognitions to discriminate approval seekers from approval avoiders and to be positively correlated with approval received.

One additional category, the laugh (LAU), is vocal rather than verbal or nonverbal. No attempt to objectively define laugh was made.

Combinatorial Categories

Combinatorial categories were employed to assess overall activity and to summarize the use of those categories broadly conceived as social rein-

forcers. Combinatorials were scored when any one of the elemental categories in the combinatorial appeared. In other words, a combinatorial was scored for an interval when the interval contained one or more of the individual categories making up the combinatorial, no effort being made to assess the number of elements of a combinatorial occurring within an interval.

Combinatorials were based on two groups of categories. One of these groups, nonverbal recognitions, included the so-called "social reinforcers" scored, i.e., smiles, nods, and laughs. These categories are not labeled social reinforcers here as there is no assurance that they have reinforcing consequences. The term "nonverbal recognition" is used on the assumption that these categories are generally used in social interaction to acknowledge or comment upon some shared event in a manner similar to the verbal recognition category. Because laughs are almost always accompanied by smiles (see Study I), the inclusion of this vocal category in nonverbal recognitions is highly redundant. The second basis for combinatorials, non-recognition activity, included all nonverbal activity with the exception of the recognitions noted above, the two positional categories--hands touching and arm lock, and TE and LE--the termination indicators for the positional categories. TE and LE were omitted on an a priori basis because they were considered to be redundant; the movement that terminated a touch or a lock was generally part of some other scoreable activity.

In the absence of a theory by which combinatorials could be con-

structed, several possible combinations of nonverbal recognitions and non-recognition activity were investigated. These are, by definition, highly redundant. The following combinatorial categories were employed:

Nonverbal Recognitions (NVREC). Nonverbal recognitions with or without simultaneous non-recognition activity.

Nonverbal Recognitions Alone (RECA). Nonverbal recognitions without simultaneous non-recognition activity.

Non-recognition Activity (ACTMR). Non-recognition activity with or without simultaneous nonverbal recognitions.

Non-recognition Activity Alone (ACTA). Non-recognition activity without simultaneous nonverbal recognitions.

Total Activity (ACT). Either nonverbal recognitions and/or non-recognition activity.

Verbal and Nonverbal Recognitions (CREC). Verbal and/or nonverbal recognitions with or without simultaneous non-recognition activity.

recognitions is highly redundant. The second

Category Reliability

non-recognition activity included all manner

All scoring for this study was done from the video-tape recordings by the reporting investigator. Measures of reliability were obtained for this investigator and another rater for each category having a substantial frequency of occurrence. In some cases, the reliability data come from earlier studies in which this investigator served as an observer. Reliability for the verbal category reported in this study, "recognition," was obtained for data reported by Rosenfeld (1966a). The verbal recog-

nition had a reliability coefficient (Pearson product moment correlation) of .97, based on frequencies noted in a sample of 20 five-minute transcripts. Reliability for nonverbal categories is given in Table 2. Reliability for those categories marked with an asterisk (*) was obtained from unpublished nonverbal data from a study by Rosenfeld and Sullwold (1969). These reliability scores are Pearson product moment correlations based on the number of two-second intervals which were scored for the designated responses in a sample of 21 to 24 30-second intervals for six subjects. All other reliability measures were obtained from data in the present study. Percentage of agreement scores (two times agreements divided by the sum of rater I and rater II's count) were obtained for 50 to 100 intervals over two to three subjects. Due to the infrequency of their occurrence, no reliability scores were obtained for shrug, head manipulation, or body shift.

Table 2

INTER-OBSERVER RELIABILITY FOR NONVERBAL CATEGORIES

Category	Reliability Score
Smile	.95
Nod	.93
Change	.86
Gesticulation*	.95*
Manipulation*	.94*
Lip Manipulation	.92
Hands Touching	1.00
Touching Runs (i.e., TS + TE)	.93
Arm Lock	1.00

Appendix IC

WITHIN-SUBJECT CORRELATIONS (PHI COEFFICIENTS)
BETWEEN SELECTED RESPONSE CATEGORIES FOR SWITCHING INTERVALS

	Ss	Category				
		NVREC	REC	SMIL	NOD	G
	(1)		+.131			
	(2)		+.036			
SMIL	(3)		+.131			
	(4)					
	(5)		+.022			
	(6)		+.053			
	(1)		+.459***	+.014		
	(2)		+.032	+.088		
NOD	(3)		+.233**	-.116		
	(4)			-.060		
	(5)		+.494***	+.034		
	(6)		+.164*	-.023		
	(1)	+.451***	+.266**	+.463***	+.099	
	(2)	+.271***	+.230**	+.265**	+.056	
ACTMR	(3)	-.179*	+.104	+.217**	-.318***	
	(4)	+.306***		+.237**	+.217**	
	(5)	+.178*	+.172*	+.103	+.119	
	(6)	+.180*	-.091	+.394***	-.110	
	(1)	+.421***	+.139*	+.507***	-.059	+.416***
	(2)	+.210*	+.220**	+.272***	-.038	+.444***
C	(3)	-.223**	-.064	+.403***	-.433***	+.462***
	(4)	+.051		+.123	-.083	+.681***
	(5)	-.054	-.104	+.050	-.212**	
	(6)	+.210**	-.079	+.418***	-.092	
	(1)	+.258**				+.328***
	(2)	+.234**				+.344***
M	(3)	+.187*				-.086
	(4)	+.278***				+.390***
	(5)	+.255**				
	(1)	+.094				
G	(2)	+.228**				
	(3)	-.341***				
	(4)	-.048				
	(1)	+.252**				
TS	(2)	+.242**				
	(3)	-.061				
	(4)	+.007				

CATEGORY

Note: * = p<.10; * = p<.05; ** = p<.01; *** = p<.001

Appendix ID

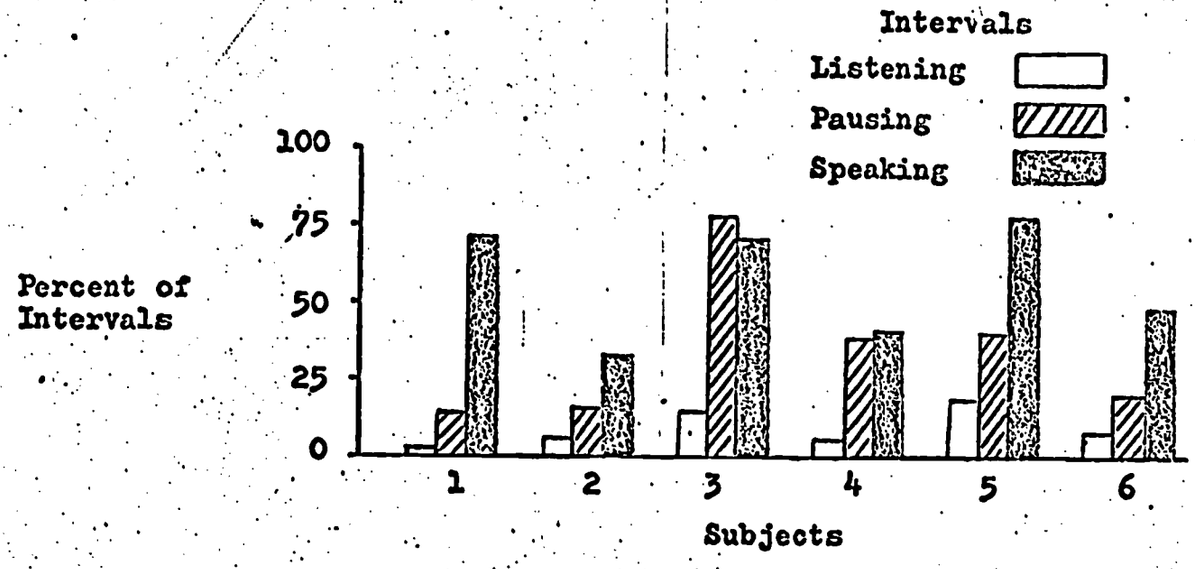

Figure 4. Nonverbal Recognitions: Percentage of Intervals in which Nonverbal Recognitions Occurred in Conversational Roles. (See Table 4 for significance levels of conversational role comparisons for nonverbal recognitions.)

TABLE 4

NONVERBAL RECOGNITIONS:
SIGNIFICANCE LEVELS OF CONVERSATIONAL ROLE COMPARISONS

Individual Subjects: Chi Square (Yates' Correction) Significance Level for Conversational Role Comparisons

Comparison	Subjects					
	1	2	3	4	5	6
Listening-Pausing	.01	.01	.001	.001	.001	.001
Pausing-Speaking	.001	.05	.50	1.	.001	.001
Listening-Speaking	.001	.001	.001	.001	.001	.001

Combined Subjects: Ordering of Nonverbal Recognitions Across Conversational Roles

Speaking $\overset{.001}{>}$ Pausing $\overset{.001}{>}$ Listening $\overset{.001}{<}$ Speaking

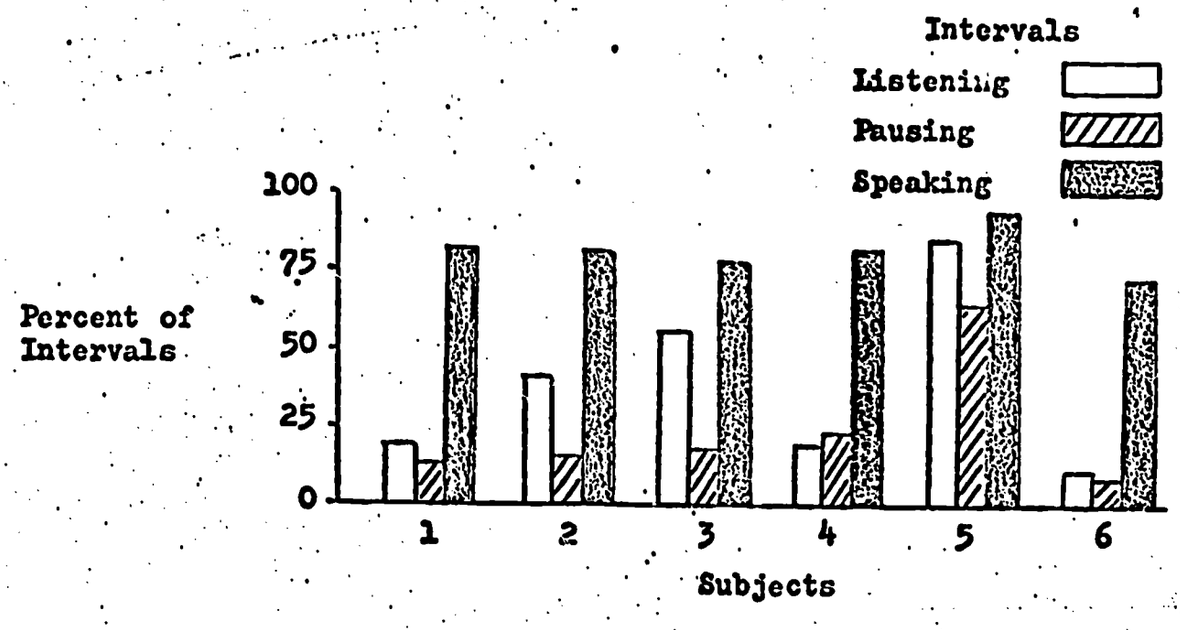

Figure 5. Non-Recognition Activity: Percentage of Intervals in which Non-Recognition Activity Occurred in Conversational Roles. (See Table 5 for significance levels of conversational role comparisons for non-recognition activity.)

TABLE 5

NON-RECOGNITION ACTIVITY: SIGNIFICANCE LEVELS OF CONVERSATIONAL ROLE COMPARISONS

Individual Subjects: Chi Square (Yates' Correction) Significance Level for Conversational Role Comparisons

Comparison	Subjects					
	1	2	3	4	5	6
Listening-Pausing	.40	.001	.001	.40	.01	.90
Pausing-Speaking	.001	.001	.001	.001	.001	.001
Listening-Speaking	.001	.001	.01	.001	.30	.001

Combined Subjects: Ordering of Non-Recognition Activity Across Conversational Roles

Speaking $\overset{.001}{>}$ Listening $\overset{.001}{>}$ Pausing $\overset{.001}{<}$ Speaking